

Greetings, and happy Halloween! Welcome to the **OCTOBER 2012** edition of the WDFW Climate News Digest (just in time...). The purpose of this digest is to provide highlights of relevant climate change news, events and resources for WDFW staff. Feedback or suggestions for items to include in future editions are much appreciated – many *thanks* to those who have sent links and references and please keep them coming.

Note that previous editions of the newsletter are now stored on the Habitat Program Sharepoint site -- <http://sharepoint.dis.wa.gov/dfw/habitat/climatechange/default.aspx>.

## WHAT'S HAPPENING AT WDFW?

*Selected projects, agency resources and initiatives*

### **Pacific Northwest Climate Change Vulnerability Assessment**

WDFW is one of several partners working on this assessment, designed to evaluate the relative vulnerability of the species and ecological systems of the Pacific Northwest to climate change. The assessment covers an area that extends beyond the borders of Washington, Oregon, and Idaho and involves scientists, natural resource managers, and conservation planners from throughout the region. The website for the Pacific Northwest Climate Change Vulnerability Assessment project has just been launched -- <http://www.climatevulnerability.org/>

The site currently provides an overview of the project and its data products, and in the future will include publications and data as they become available. The PNWCCVA project also includes a species sensitivity database, available here - <http://climatechangesensitivity.org/>. Note that you need to register to use the sensitivity site, but it doesn't take long and will enable full access to the data. For questions on this project, please contact Bruce Thompson (902-2505) or Lynn Helbrecht (902-2238).

### **WDFW Climate Adaptation Handbook**

This project is intended to develop practical, hands on tools and guidance for WDFW staff and managers on when and how to integrate climate considerations into projects and activities. Not all activities will be equally affected by projected climatic changes such as warming temperatures, sea level rise, hydrology shifts and increases in extreme weather events. But for those projects with long timeframes, or big infrastructure investments we are interested in learning how to apply what we know about future climatic changes to ensure that our investments will be robust and successful. Over the next several months we will be working with a number of staff throughout the agency on a series of pilot projects, and then use the findings to develop a guidance document called the Climate Adaptation Handbook. Find a one pager describing this initiative at the Habitat Program Sharepoint site -- <http://sharepoint.dis.wa.gov/dfw/habitat/climatechange/Shared%20Documents/Forms/AllItems.aspx>. Suggestions or comments about this project are welcome.

Many thanks to those staff who have agreed to participate in the project to date. If you are working on a project you think has a strong climate nexus and are interested in exploring how climate change might affect project success, please be in touch!

## CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

**The Sauk-Suiattle Tribe is studying how climate change will affect members of the tribe and the natural resources that sustain them.**

<http://nwifc.org/2012/09/sauk-suiattle-tribe-plans-for-climate-change/>

“The tribe values a healthy river as equal to a healthy and vibrant human community,” said Jason Joseph, Sauk-Suiattle natural resources director. “This project will be a case study of sustainability in the face of global warming. We’re focusing on the effects on fisheries and reservation infrastructure.” The homes and administration buildings of the Sauk-Suiattle reservation are on the banks of the Sauk River near Darrington. With nearly 400 glaciers in the region, the Sauk and other tributaries to the Skagit River – the Suiattle and Whitechuck – will see rapid change as the climate continues to warm. The study is supported by a federal Environmental Protection Agency grant made available through the Puget Sound Partnership, and a partnership with the U.S. Geological Survey and Natural Systems Design, Inc. **For more information, contact:** Robert Franklin, fisheries manager, Sauk-Suiattle Tribe 360-436-0347 or [rfranklin@sauk-suiattle.com](mailto:rfranklin@sauk-suiattle.com); Kari Neumeyer, information officer, NWIFC, 360-424-8226 or [kneumeyer@nwifc.org](mailto:kneumeyer@nwifc.org).

## LEARNING OPPORTUNITIES

### **November 7<sup>th</sup>, 12:00-1:00 pacific time – “Climate Projections 101: Informing Adaptation Planning for Fish & Wildlife Management”**

Live Meeting Webinar ([click here to join](#), up to 30 minutes prior)

Audio: 1.888.858.2144, passcode 1418655

Climate scenarios offer one way to identify and examine the land management challenges and opportunities posed by climate change. Scientists with the U.S. Forest Service will provide an introduction to climate projections. [Amy Daniels](#), National Program Leader for Landscape Science, will describe the key concepts that the end-users of climate projection products should understand to appropriately interpret such information, including various sources of uncertainty. These concepts are reviewed in the Forest Service publication [Climate Projections FAQ](#). To demonstrate how climate projections are being used in the Forest Service, the webinar will feature two examples:

[Kevin McKelvey](#), Forest Service Research Ecologist, will present his work on potential shifts in wolverine distributions through analysis of projected changes in persistent spring snow cover in the Colombia, Upper Missouri and Upper Colorado River Basins (publication [here](#)).

[Dan Isaak](#), Forest Service Research Fisheries Scientist, will discuss forecasted effects of altered flow regime and increased temperature on four interacting trout species across the interior west (publication [here](#))

### **Curious about how climate models work?**

The UCAR COMET Program, sponsored by NOAA's National Weather Service, announces the publication of a new training module, "Introduction to Climate Models." The new module illustrates how climate models work. Because the modeling of both weather and climate share many similarities, the content throughout this module draws frequent comparisons and highlights the differences between the two approaches. This module explains not only how, but why climate models differ from weather models. In addition, the module explores the difference between weather and climate and shows how models are built to simulate climate and generate the statistics that describe it. This module concludes with a discussion of how models are tuned and tested. This module is aimed at the weather forecasting community, which is already familiar with National Weather Program models. However, non-forecasters with an interest in weather and climate may also find the module useful. For more information, visit: [https://www.meted.ucar.edu/training\\_module.php?id=913](https://www.meted.ucar.edu/training_module.php?id=913).

## **Early Warning! January 3<sup>rd</sup>, 12:00 – 1:00, Natural Resources Building, Olympia, “Climate Variability in the Northwest”.**

Washington State Climatologist Nick Bond will join us to give a presentation on climate variability in the Northwest, highlighting primary patterns of variability, observed trends, predictability and tools for acquiring and processing climate data from the Office of the Washington State Climatologist. More details to come next month!

## **RESOURCES**

### **Presentations now available from the 3<sup>rd</sup> annual PNW Climate Science Conference**

The Pacific Northwest Climate Science Conference was held on October 1-2 in Boise, ID. The conference aims to provide an annual forum to exchange scientific results and policy and management options related to climate change and climate impacts research focused on the Pacific Northwest. The conference also provides a forum for the presentation of emerging policy and management goals, objectives, and information needs related to regional climate impacts and adaptation. In addition to climate science, the conference focuses on a combination of cross-cutting topics of relevance to multiple disciplines, as well as on clear practical applications of climate change science. **Find recorded talks and presentations from the conference [here](#).**

**The Skagit Climate Science Consortium and the Skagit Watershed Council** hosted a workshop on October 17<sup>th</sup> focusing on **Salmon and Climate Change in the Skagit Basin**.

Presentations included talks on hydrology, sediment dynamics, sea level rise, marsh erosion and accretion, impacts to salmon at different life stages and more. Powerpoint presentations are available [here](#).

### **US Forest Service Climate projections FAQ**

[Climate scenarios offer one way to identify and examine the land management challenges posed by climate change. Selecting projections, however, requires careful consideration of the natural resources under study, and where and how they are sensitive to climate. Selection also depends on the robustness of different projections for the resources and geographic area of interest, and possibly on what climate projections are available for a region. The FAQ document here describes key concepts that end-users of climate projection products should understand to appropriately interpret downscaled climate projections, including various sources of uncertainty.](#)  
[http://www.fs.fed.us/rm/pubs/rmrs\\_gtr277.pdf](http://www.fs.fed.us/rm/pubs/rmrs_gtr277.pdf)

### **New website focuses on Corridor Conservation**

[ConservationCorridor.org](http://ConservationCorridor.org) will highlight recent advances in corridor science, and will feature new innovations in corridor conservation. A centerpiece of ConservationCorridor.org will be its "Digests," short summaries of recent scientific papers, and of new applications of corridors in conservation. These will be updated monthly. There are many tools available to analyze and implement corridors; is not one of those tools. Rather, the site is intended to be a portal that directs scientists and conservationists toward tools that exist.

## **CLIMATE SCIENCE NEWS**

## Island Wildlife Decline, Linked To Ocean Acidification, 'Could Prove A Bellwether For Oceanic Change Globally'

The *NY Times* published a [sobering piece](#) recently about Tatoosh Island off the coast of Washington state. *[Excerpt from the article]* For over four decades, with the blessing of Makah leaders, Tatoosh has been the object of intense biological scrutiny, and scientists say they are seeing disturbing declines across species — changes that could prove a bellwether for oceanic change globally. Among the declines the researchers are noticing: historically hardy populations of gulls and murre are only half what they were 10 years ago, and only a few chicks hatched this spring. Mussel shells are notably thinner, and recently the mussels seem to be detaching from rocks more easily and with greater frequency. Goose barnacles are also suffering, and so are the hard, splotchy, wine-colored coralline algae, which appear like graffiti along rocky shorelines. Biologists suspect that the shifts are related to huge declines in the water's pH, a shift attributed to the absorption of excess carbon dioxide being released into the atmosphere in ever-greater amounts by the burning of fossil fuels for energy. As the carbon dioxide is absorbed, it alters the oceanic water chemistry, turning it increasingly acidic. Barnacles, oysters and mussels find it more difficult to survive, which can cause chain reactions among the animals that eat those species, like birds and people. During a research trip in 2000, Dr. Pfister and Dr. Wootton first began testing the pH of water samples. They found the water around Tatoosh and along nearby coastlines to be 10 times as acidic as what accepted climate change models were predicting. Even after collecting seven years of data, when they published their findings in the Proceedings of the National Academy of Sciences in 2008, their data were met with skepticism. "People think we just don't know how to use the instrument — I still hear that," Dr. Pfister said. "Luckily for our reputations, I guess, this has been corroborated by a lot of other people."

### **... And More on Ocean Acidification**

[http://www.washingtonpost.com/national/health-science/ocean-acidification-emerges-as-new-climate-threat/2012/09/30/8457e6e8-08b8-11e2-aff-d6c7f20a83bf\\_story.html](http://www.washingtonpost.com/national/health-science/ocean-acidification-emerges-as-new-climate-threat/2012/09/30/8457e6e8-08b8-11e2-aff-d6c7f20a83bf_story.html)

In the past five years, the fact that human-generated carbon emissions are making the ocean more acidic has become an urgent cause of concern to the fishing industry and scientists.

The ocean absorbs about 30 percent of the carbon dioxide we put in the air through fossil fuel burning, and this triggers a chemical reaction that produces hydrogen, thereby lowering the water's pH.

The sea today is 30 percent more acidic than pre-industrial levels, which is creating corrosive water that is washing over America's coasts. At the current rate of global worldwide carbon emissions, the ocean's acidity could double by 2100. What impact it is having on marine life, how this might vary by geography and species, and what can be done about it if humans do not cut their carbon output significantly are some of the difficult questions scientists and policymakers are seeking to answer. The decline in pH will likely disrupt the food web in many ways. It is making it harder for some animals, such as tiny pteropods and corals, to form their shells out of calcium carbonate, while other creatures whose blood chemistry is altered [become disoriented and lose their ability to evade predators](#)

**NOTE:** [Washington's Blue Ribbon Panel on Ocean Acidification](#) is scheduled to release its report in late November, 2012.

## **SPECIES AND HABITATS**

### **Warming Ocean Temperatures and Species Shifts**

The [top ocean predators](#) in the North Pacific could lose as much as 35 percent of their habitat by the end of the century as a result of [climate change](#), according to a study published in the journal Nature Climate Change. The analysis, conducted by a team of 11 American and Canadian researchers, took data compiled from tracking 4,300 open-ocean animals over a decade and looked at how predicted temperature changes would alter the areas they depend on for food and shelter. Some habitats could shift by as much as 600 miles while others will remain largely unchanged, the scientists found, and these changes could affect species in different ways.

<http://www.sciencedaily.com/releases/2012/09/120924102700.htm>

## POLICY AND MANAGEMENT - MITIGATION AND ADAPTATION

### [The Adaptation for Conservation Targets \(ACT\) Framework: A Tool for Incorporating Climate Change into Natural Resource Management](#)

[Environmental Management](#), Volume 50, Number 3 (2012), 341-351, July 2012

[Molly S. Cross](#), [Erika S. Zavaleta](#), [Dominique Bachelet](#), [Marjorie L. Brooks](#), [Carolyn A. F. Enquist](#), [Erica Fleishman](#), [Lisa J. Graumlich](#), [Craig R. Groves](#), [Lee Hannah](#) and [Lara Hansen](#), et al.

ABSTRACT: As natural resource management agencies and conservation organizations seek guidance on responding to climate change, myriad potential actions and strategies have been proposed for increasing the long-term viability of some attributes of natural systems. Managers need practical tools for selecting among these actions and strategies to develop a tailored management approach for specific targets at a given location. We developed and present one such tool, the participatory Adaptation for Conservation Targets (ACT) framework, which considers the effects of climate change in the development of management actions for particular species, ecosystems and ecological functions. Our framework is based on the premise that effective adaptation of management to climate change can rely on local knowledge of an ecosystem and does not necessarily require detailed projections of climate change or its effects. We illustrate the ACT framework by applying it to an ecological function in the Greater Yellowstone Ecosystem (Montana, Wyoming, and Idaho, USA)—water flows in the upper Yellowstone River. We suggest that the ACT framework is a practical tool for initiating adaptation planning, and for generating and communicating specific management interventions given an increasingly altered, yet uncertain, climate.

### **Climate Change, Uncertainty and Natural Resource Management (article attached)**

*(excerpt from the abstract)* Although aspects of climate change may be novel (e.g., system change and non-stationarity), natural resource managers have long dealt with uncertainties and have developed corresponding approaches to decision-making. Adaptive resource management is an application of structured decision-making for recurrent decision problems with uncertainty, focusing on management objectives, and the reduction of uncertainty over time. We identified 4 types of uncertainty that characterize problems in natural resource management. We examined ways in which climate change is expected to exacerbate these uncertainties, as well as potential approaches to dealing with them. As a case study, we examined North American waterfowl harvest management and considered problems anticipated to result from climate change and potential solutions. Despite challenges expected to accompany the use of adaptive resource management to address problems associated with climate change, we conclude that adaptive resource management approaches will be the methods of choice for managers trying to deal with the uncertainties of climate change.

## **Workshop Synthesis Report Published: "Defense, National Security, and Climate Change: Building Resilience and Identifying Opportunities Related to Water, Energy and Extreme Events"**

On June 25-26, 2012, over 130 leaders working in the climate and defense nexus gathered to share insights in roundtable sessions and listen to leaders representing a broad range of organizations and perspectives. The workshop aimed to present a variety of perspectives from the defense and associated communities on the national security and defense implications of climate change. By bringing together the leading minds in the field, the workshop sparked conversations and allowed participants to learn and share insights on the state of climate change work in the defense community. The purpose of this report is to distill some of the main themes and ideas derived from the workshop and synthesize what was learned. To view the report, visit: <http://www.accoonline.org/downloads/ACCO-CCLS-June2012-Report.pdf>.

### **Climate change and the American mind**

Our desire to be socially agreeable may trump our willingness to engage in science-based discussions about climate change, according to Yale professor of law and psychology Dan Kahan. Kahan examines how the issue has caused cultural polarization that hinders our collective ability to act in our common interest. However, surveys conducted by the Center for Climate Change Communication indicate a majority of the American public does support action on climate change.